

**WHAT IS CLAIMED IS:**

1. A method for administering a therapeutic molecule to a mammal, comprising:  
administering to the mammal an effective amount of a composition comprising a  
5 amphifullerene liposome comprising at least one amphifullerene, wherein the therapeutic  
molecule is located on the surface of the liposome, between layers of the liposome, entrapped  
within the liposome, or associated with a fullerene.
2. The method of claim 1, wherein at least one amphifullerene in the outer surface of the  
10 amphifullerene liposome comprises a functional group selected from the group consisting of  
biotin, biotin-containing moieties, antigen-binding moieties, and tissue-recognition moieties.
3. The method of claim 1, further comprising releasing the therapeutic molecule from  
the buckysome.
- 15 4. The method of claim 1, wherein the therapeutic molecule is a diagnostic molecule.
5. The method of claim 4, wherein the diagnostic molecule is an MRI contrast agent, a  
CT contrast agent, an X-ray contrast agent, a nucleoscan contrast agent, an agent with at least  
20 one UV/visible absorption peak, or an ultrasonic contrast agent.
6. The method of claim 1, wherein the therapeutic molecule is a sedating drug.
7. The method of claim 1, wherein administering comprises inhalation of an aerosol of  
25 the amphifullerene liposome.
8. The method of claim 3, wherein the therapeutic molecule is a sedating drug.
9. The method of claim 8, wherein releasing comprises temperature-controlled diffusion,  
30 pH-controlled diffusion, or both.
10. A amphifullerene liposome, comprising:  
an amphiphilic fullerene, and

a therapeutic agent located on the surface of the liposome, between layers of the liposome, entrapped within the liposome, or associated with a fullerene.

11. The amphifullerene liposome of claim 10, wherein the amphiphilic fullerene further  
5 comprises a functional group selected from the group consisting of biotin, biotin-containing moieties, antigen-binding moieties, and tissue-recognition moieties.

12. The amphifullerene liposome of claim 10, wherein the therapeutic agent is a  
10 diagnostic molecule selected from an MRI contrast agent, a CT contrast agent, an X-ray contrast agent, a nucleoscan contrast agent, an agent with at least one UV/visible absorption peak, or an ultrasonic contrast agent.

13. The amphifullerene liposome of claim 10, wherein the therapeutic agent is a sedating  
15 drug.

14. The amphifullerene liposome of claim 10, wherein the amphifullerene liposome is aerosolized.

15. A method of forming an amphifullerene liposome comprising a therapeutic agent,  
20 comprising:

sonicating a solution of the amphifullerene liposome and the therapeutic agent.

16. A method of forming an amphifullerene liposome comprising a therapeutic agent,  
comprising:

25 co-vaporizing a solution of the amphifullerene liposome and a solution of the therapeutic agent.